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Town of Concord

APP # 38
Municipal Outdoor Lighting Policy and Guidelines

This replaces APP #38, Street Lighting Policy, dated September 19, 1983, as amended May 22, 1995.

This Municipal Outdoor Lighting Policy was produced by the Concord Outdoor Lighting Committee October 25, 2001, and adopted by the Concord Board of Selectmen December 17, 2001.

1. Purpose of Municipal Outdoor Lighting

The Town of Concord provides municipal outdoor illumination for public safety and convenience, security of buildings, and to display the beauty of town buildings and public spaces at night.

2. Town Lighting Policy

The Town of Concord's general policy is to provide the minimum amount of lighting necessary to accomplish these purposes in a uniform and equitable manner across town, consistent with the goals of energy efficiency, cost effectiveness, and aesthetic appropriateness.

This policy applies to all municipal outdoor lighting installations, including illumination of roadways, sidewalks, municipal buildings, public parking lots, public spaces, and municipal signs.

3. Lighting Guidelines

This policy presents guidelines for municipal outdoor lighting in Concord.[1] As stated in the Concord Zoning Bylaw, exterior lighting should be aimed, located, designed, fitted, and maintained so that it illuminates the task intended and does not shine directly onto neighboring properties, roadways, or distribute excessive light skyward.

3.1. Lighting Zones

As a framework for lighting decisions, this policy identifies three lighting zones, as follows:

Zone 1: Areas with intrinsically dark landscapes. Examples are parks, open land, conservation land, farms, and undeveloped land bordering Route 2.

[1] Additional background information is presented in the "Outdoor Lighting Report" of the Outdoor Lighting Committee.

Zone 2: Areas of low ambient brightness. These include most residential areas. Roadways may be lighted to suit the character of the residential area and the amount of traffic in the area.

Zone 3: Areas of medium ambient brightness. These are commercial areas, including busy intersections and pedestrian crosswalks, parking lots, and light-industrial areas.

3.2. Illuminance Levels

Different illuminance levels are required for different applications. The following illuminance recommendations are stated in visual units (foot-candles) not power requirements (watts) to afford flexibility in adapting to advancing technology. The recommended color quality of the light source is white with a minimum CRI (Color Rendering Index) of 65 and a CRI of 80 in portions of the Historic Districts.[2]

3.2.1. Table of Recommended Illuminance Levels[3]

The following illuminance levels for outdoor lighting are recommended target values for lighting design goals. Illuminance levels are given in foot-candles (fc)[4]. *Eavg* is Average Maintained Illuminance. *Emin–Emax* is Minimum to Maximum Maintained Illuminance.

Location	Lighting Zone	Eavg (fc)	Emin–Emax (fc)	Minimum CRI
Roadways in commercial areas	3	0.6	0.2–1.2	65
Roadways in residential areas	2	0.2	0.1–0.3	65
Roadways in rural areas*	1	0.1	0–0.3	65
Pedestrian crossings in commercial areas	3	1.0	0.5–1.5	65
Sidewalks in commercial areas	3	0.6	0.2–1.0	65
Parking lots	3	0.5	0.1–1.0	65
Floodlit buildings, monuments (measured vertically)	3	6.0	2.0–10.0	65
Historic Area A	3	0.6	0.2–1.2	80

[2] CRI (color rendering index) compares the rendering of eight standard colors under a standard lamp and under the lamp being tested. A standard incandescent lamp has a CRI of 100.

[3] Recommended values are based upon practices endorsed by the Illuminating Engineering Society of North America (IESNA), and measurements of the Outdoor Lighting Committee. See publications IES RP-8-83 "Roadway Lighting" and IES RP-33-99 "Lighting for Exterior Environments."

[4] A foot-candle is a unit of illuminance equal to one lumen uniformly distributed over one square foot.

Location	Lighting Zone	Eavg (fc)	Emin–Emax (fc)	Minimum CRI
Historic Area B	3	0.6	0.2–1.0	80
Historic Area C	1,2	0.1	0.0–0.5	65

**Intersections may require the maximum illumination in the given range.*

Note: Illuminance readings are measured horizontally at ground level.

3.2.2. Concord Historic Districts

Concord's Historic Districts require special lighting consideration in order to preserve and enhance their unique qualities. Lighting installations within the Historic Districts should use cut-off fixtures, unless circumstances warrant historically appropriate non-cutoff fixtures which have been approved by the Historic District Commission. Where non-cutoff fixtures are employed, lamps of relatively low luminosity (maximum rating of 2000 lumens) should be used to reduce glare and to enhance the historical character and ambience of the Districts.

All municipal entities must meet with the Historic District Commission to discuss any changes or additions in luminaires[5] or poles to be used within a historic district.

This policy designates the following three areas of the Historic District. Recommended illuminance levels for these areas are given in table 3.2.1.

Historic Area A

This is the area of commercial, retail, and institutional properties associated with the Milldam from the flagpole to the library and Monument Square. In this area, poles and luminaires shall have an illuminance level, color, shape, and size consistent with the historic character of the Town's center. White light with a CRI of 80 or higher is highly desirable in this area.

Historic Area B

This area is comprised of those sections of Concord Center not included in Historic Area A which contain mixed office, institutional, or residential uses where development is relatively dense. In this area, poles and luminaires will reflect more sensitivity to the historic setting than standard commercial poles and fixtures. White light with a CRI of 80 or higher is highly desirable in this area.

[5] A luminaire, commonly called a light fixture, consists of a lamp (bulb), ballast, and housing.

Historic Area C

This is the area of rural and residential properties extending to the boundaries of each historic district exclusive of Historic Areas A and B. White light with a CRI of 65 or higher is highly desirable in this area.

3.3. Control of Glare and Light Trespass

All luminaires, regardless of rating, should be selected to significantly reduce light trespass[6] onto any abutting lot or parcel and to significantly reduce glare[7] perceptible to pedestrians or motorists, or persons on an abutting lot or parcel. Luminaires equipped with shielding should also be capable of being properly aimed to maintain the shielding characteristics.

Any luminaire with a lamp or lamps rated at a total of 2000 lumens or more should be a full-cutoff type[8]. Luminaires intended solely to illuminate a free-standing sign or the walls of a building may be exempted from this requirement, but such luminaires must be shielded so that their direct light is confined to the surface of such sign or building. Some types of lighting are in conflict with this policy. These include farm lights, unshielded wall packs, and box floodlights, all of which produce particularly high glare. Their replacement should be given high priority. Glare from existing free-standing acorn-style lamps should be reduced by using less bright lamps.

3.4. Lamps

Lamps for outdoor lighting should be selected on the basis of cost and performance. Cost factors include purchase price, installation cost, maintenance cost, energy efficiency, and useful life. Performance factors include color, lumen output, and maintenance of lumen output. Among the factors governing choice of lamp type, energy efficiency shall rank high, but after color rendering index. Engineering calculations based upon manufacturers' data and previous experience can define the choice in conformity with budget constraints.

High-pressure sodium (HPS) lamps, which have poor color rendering, are considered unacceptable and their replacement should be given high priority. It is recommended that clear mercury-vapor lamps be replaced, as they burn out, with lamps of the recommended CRI.

Currently available lamps that meet this policy's CRI criteria include:

- Incandescent

[6] Light trespass refers to illumination that extends beyond the boundaries of the lot on which the luminaire is located in a manner deemed objectionable by occupants of the adjacent lot.

[7] Glare is the sensation produced by luminance within the visual field that is sufficiently greater that the luminance to which the eyes are adapted to cause annoyance, discomfort, or loss of visual performance and visibility. Objects near a source of glare are difficult to see.

[8] A full-cutoff luminaire has a light distribution where zero intensity occurs at an angle of 90 degrees above vertical and at all greater angles from vertical. This applies to all lateral angles around the luminaire. (From IESNA publication RP-33-99, p. 17.)

- Incandescent (tungsten) halogen
- Metal halide
- Compact fluorescent
- QL induction
- ICETRON 100

3.5. Municipal Sidewalks, Walkways, and Crosswalks

Street lighting may provide incidental sidewalk lighting in high pedestrian-use areas such as commercial centers, and the choice of new lighting fixtures should take this into consideration. Additionally, lighting may be desirable for walkways through parks, parking lots, or to municipal facilities and buildings.

Pedestrian crosswalks at intersections and elsewhere should be illuminated by glare-free focused light sources at either end designed to insure visibility to motorists and pedestrians alike.

3.6. Municipal Buildings and Signs

Buildings may be illuminated at night for reasons of safety and recognition. Architectural lighting can include floodlighting, outlining, and spotlighting. New or substantial replacement of outdoor lighting of public buildings will be in conformance with the design criteria of the Site Plan Approval – Exterior Lighting provisions of the Concord Zoning Bylaw. This policy is not intended to supersede the requirements of the Massachusetts State Building Code. New or replacement lighting of municipal signs will be in conformance with the Concord Sign Bylaw.

3.7. Municipal Parking Lot Lighting

Parking lot lighting should be designed to provide the minimum lighting necessary to ensure public safety and convenience and to avoid glare or direct illumination onto adjacent properties or streets. Parking lot lighting recommendations for the lighting zones defined in section 3.1, page 1, are shown in the following table drawn from "Outdoor Lighting Manual for Vermont Municipalities," Chittenden County (VT) Regional Planning Commission, 1996:

3.7.1.Table of Parking Lot Lighting Recommendations

	Zone 1	Zone 2	Zone 3
Maximum Mounting Height*	---	20 ft	20 ft
Minimum Illuminance at darkest spot (fc)	---	0.2–0.3	0.2–0.5
Uniformity Ratio**	---	4:1	4:1

	Zone 1	Zone 2	Zone 3
Minimum CRI	---	65	65

--- Signifies an installation is discouraged.
*Mounting height is the vertical distance between the surface being illuminated and the bottom of the lighting fixture.
** Uniformity ratio is the ratio of average to minimum illumination.

Parking lot lighting should follow these guidelines:

- All luminaires serving parking lots should be cut-off fixtures as defined by IESNA (the Illuminating Engineering Society of North America).
- If such fixtures are not cut-off fixtures as defined by IESNA, the maximum initial lumens generated by each fixture shall not exceed 2000 (equivalent to a 150-watt incandescent bulb), and mounting height shall not exceed 15 feet.

3.8. Municipal Sports and Recreational Facilities Area Lighting

The design of outdoor lighting for municipal sports and recreational facilities is subject to the same controls for glare, light trespass, and hours of operation as outdoor lighting for other uses. Thus, when sports fields are located adjacent to roadways, the sports lighting should not contribute glare onto the roadways. When sports fields are located adjacent to residential communities, the overall brightness should be carefully controlled. The lighting for all outdoor sports fields should take into account surrounding community brightness and be designed to minimize “sky glow.”

Recommended illuminance levels and pole heights vary from sport to sport. The design of new facilities and/or the redesign of existing facilities should follow recommended design guides and practice for each sport as contained in IESNA publication RP 6 – 88 “Sports and Recreational Area Lighting,” or in updated versions of the same. This publication covers design of new sports lighting systems, design of multi-sport lighting systems, and evaluation of existing installations.

3.9. Hours of Operation

New or substantial replacement of outdoor lighting, other than street lighting, should be turned off between the hours of 12:00 midnight and 6:00 A.M. with the following exceptions:

a. If a municipal facility (building or open area) is in use after sunset, then exterior lighting can be used during the event or activity, but should be turned off after the event or activity ends.

b. Low-level lighting sufficient for the security of persons or property may be in operation between 12:00 midnight and 6:00 A.M., provided that the average illumination on the ground or on any vertical surface is not greater than 0.2 foot-candles.

4. Administration

The Town Manager shall be responsible for the overall implementation of this policy. The Department of Planning and Land Management shall review and approve the exterior lighting proposals associated with municipal installations. Municipal agencies are strongly encouraged to consult with the Department in the early phases of facility planning and design.

5. Exceptions

Special local circumstances affecting safety, security, light pollution, or aesthetic considerations may require departure from these guidelines.

Additionally, cost considerations may require departure from full implementation of these guidelines, but these considerations must include evaluation of lifetime costs and performance, not merely initial cost.

Departures must be approved by the Town Manager, or his designee the Director of the Department of Planning and Land Management (with input from the Police Department, the Municipal Light Plant, the Department of Planning and Land Management, and/or Concord Public Works). All such departures from the guidelines should still minimize glare and light trespass adversely affecting motorists, pedestrians, and residential properties.